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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/686,894	10/15/2003	Raymond Miller Karam II	033867-002	7549
21839	7590	07/12/2005	EXAMINER	
BUCHANAN INGERSOLL PC (INCLUDING BURNS, DOANE, SWECKER & MATHIS) POST OFFICE BOX 1404 ALEXANDRIA, VA 22313-1404			LAVARIAS, ARNEL C	
			ART UNIT	PAPER NUMBER
			2872	

DATE MAILED: 07/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/686,894

Applicant(s)

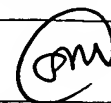
KARAM, RAYMOND MILLER

Examiner

Arnel C. Lavarias

Art Unit

2872



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 5/12/05, 3/17/04, 10/15/03.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) 1-22 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 23-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>3/17/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Invention II, Claims 23-29, in the reply filed on 5/12/05 is acknowledged. The traversal is on the ground(s) that the essential elements of the structure of the grating product (i.e. the substrate layer, the adhesive layer, and the reflective layer) and the manner of making the grating lines recited in Claims 1-14, and the essential elements of the method of making the reflective grating product using a laser as recited in Claims 15-22 are both recited in the process followed by the system as recited in Claims 23-29 in making the reflective grating product, and therefore a fair and complete search of the prior art relating to the system for making the grating product will necessarily include the same prior art to be search with regard to the product and method. This is not found persuasive because both the product and the method recite a non-reflective substrate layer, a non-reflective adhesive layer disposed on the substrate layer, and a reflective surface layer disposed on the adhesive layer, all of which are not recited in the claims drawn to the system. Further, the system recites a tape having a substrate, an adhesion layer, and a surface layer, as well as the system including feed rolls, drive rollers, and take-up reels, all of which are not recited in the claims drawn to the product or method. Thus, separate searches are required for each of the product/method claims and the system claims.

The requirement is still deemed proper and is therefore made FINAL.

Art Unit: 2872

2. Claims 1-22 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 5/12/05.

Drawings

3. The originally filed drawings were received on 10/15/03. Formal drawings were received on 3/17/04. The formal drawings are acceptable.

Specification

4. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. *It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.*

5. The abstract of the disclosure is objected to because of the following informalities:

Abstract, line 1- delete 'is disclosed'.

Correction is required. See MPEP § 608.01(b).

6. The disclosure is objected to because of the following informalities:

Paragraph 0019, line 3- 'gold' should read 'gold.'

Art Unit: 2872

Paragraph 0034, lines 11, 13- 'imagable' should read 'imageable'

Paragraph 0036, line 6- 'nyquist' should read 'Nyquist'.

Appropriate correction is required.

7. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

Claim 28 recites the limitation that '... the laser melts the portions of the surface layer to expose the adhesion layer.' However, the specification of the disclosure (See Paragraph 0034) specifically discloses that the use of the laser to melt portions of the surface layer to expose the adhesive layer is an alternative embodiment to that of using the laser to write grating lines by vaporizing portions of the surface layer to expose the adhesion layer, which is expressly recited in independent Claim 23.

Claim 29 recites the limitation that '... the grating lines are formed in the surface layer by selectively exposing portions of the photo-imageable layer with the laser.' However, the specification of the disclosure (See Paragraph 0034) specifically discloses that forming grating lines in the surface layer by selectively exposing portions of a photo-imageable layer with a laser is an alternative embodiment to that of using the laser to write grating lines by vaporizing portions of the surface layer to expose the adhesion layer, which is expressly recited in independent Claim 23.

Claim Objections

8. Claim 29 is objected to because of the following informalities:

Claim 29, lines 2, 4- 'imagable' should read 'imageable'

Claim 29 recites the limitation "the reflective surface layer" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claim 23, 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahara et al. (JP 05265365A) in view of Koyama et al. (U.S. Patent No. 6291797).

Takahara et al. discloses a system (See for example Figures 1, 4) for forming a reflective grating (See Figures 2-3, 5-7) from a tape having a substrate (See for example 13 in Figure 5), an adhesion layer (See for example 11 in Figure 5), and a surface layer (See for example 12 in Figure 5), the system comprising a feed roll having the tape rolled thereon (See for example left-most roller in Figure 4); a drive roller for retrieving the tape from the feed roll (See for example roller to the right of the left-most roller in Figure 4, see also 4, 3, 6 in Figure 4); an embossing means for creating the grating (See 5 in Figure 5); and a take-up reel (See for example 7 in Figure 4) for rolling the tape into a roll after being embossed. Takahara et al. lacks a laser, such as a high frequency pulsed laser, for writing grating lines onto the tape by vaporizing portions of the surface layer to expose

the adhesion layer, instead of using an embossing means for creating the grating.

However, Koyama et al. teaches an alternative system and method for creating a reflective grating, wherein laser processing is utilized to selectively expose and ablate or evaporate surface layers from a substrate (See Abstract; Figures 1, 4-10). In particular, Koyama et al. teaches that a laser, such as a high frequency pulsed laser (See for example col. 6, lines 33-51), may be utilized to selectively write grating lines onto surface layers deposited on a substrate by selective exposure and ablation or evaporation of a surface layer (See for example Embodiment 6 in col. 9-10 and Embodiment 11 in col. 12-14; top TiO₂ layer in Figures 6-8), as well as ablation or evaporation of underlying adhesion layers (See underlying TiO₂ and SiO₂ layers in Figures 6-8). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the system of Takahara et al. further utilize a laser, such as a high frequency pulsed laser, for writing grating lines onto the tape by vaporizing portions of the surface layer to expose the adhesion layer, instead of using an embossing means for creating the grating, as taught by Koyama et al., to take advantage of the high manufacturing speed, cost-effectiveness, and high precision and accuracy in fabricating the grating lines using a laser.

11. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takahara et al. in view of Koyama et al. as applied to Claim 23 above, and further in view of Liu et al. (U.S. Patent No. 6580054).

Takahara et al. in view of Koyama et al. discloses the invention as set forth above in Claim 23, except for the system further comprising a read head for verifying that the laser

station vaporizes the surface layer. However, the use of such diagnostic heads and detectors for determining the state of a workpiece or sample is known in the art. For example, Liu et al. teaches a conventional scribing system for scribing a material (See for example Abstract; Figures 1-3), wherein the system includes diagnostic instrumentation, such as a CCD camera and an edge detection electronics system (See for example 20, 22 in Figure 1), to verify the scribing patterns on the material. In particular, the use of the CCD camera allows for visual verification and checking of the scribing patterns (See Figures 7, 9-16). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the system of Takahara et al. in view of Koyama et al. further include a read head for verifying that the laser station vaporizes the surface layer, as taught by Liu et al., for the purpose of providing accurate data regarding the laser processing of the surface layer to produce the grating lines, wherein the data may be used to further enhance the accuracy and precision of the laser processing.

12. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takahara et al. in view of Koyama et al. as applied to Claim 23 above, and further in view of Miekka et al. (U.S. Patent No. 5629068).

Takahara et al. in view of Koyama et al. discloses the invention as set forth above in Claim 23, except for the system further including a contact adhesive feed roll for applying a contact adhesive to the substrate. However, the use of such adhesive feed rolls in such systems is known in the art. For example, Miekka et al. teaches a conventional method and system for fabricating a diffraction grating on a substrate (See for example Figure 4), wherein the system includes an adhesive head and roller (See 68,

69 in Figure 4) for applying adhesive onto the substrate (See 52, 54 in Figure 4). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the system of Takahara et al. in view of Koyama et al. further include a contact adhesive feed roll for applying a contact adhesive to the substrate, as taught by Miekka et al., for the purpose of reducing manufacturing time in applying adhesives onto the substrate for later lamination or bonding processes.

13. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takahara et al. in view of Koyama et al. as applied to Claim 23 above, and further in view of Hunter, Jr. et al. (U.S. Patent No. 5364493).

Takahara et al. in view of Koyama et al. discloses the invention as set forth above in Claim 23, except for the laser melting the portions of the surface layer to expose the adhesion layer. However, Hunter, Jr. et al. teaches that during the process of utilizing a high output laser to perform etching via ablation or evaporation of a surface layer, such as a metal layer, the surface layer will undergo heating, then melting, then finally evaporation, all of which are dependent on the power level of the laser (See col. 5, line 61-col. 6, line 2). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the laser melt the portions of the surface layer to expose the adhesion layer, as taught by Hunter, Jr. et al., in the system of Takahara et al. in view of Koyama et al., to promote evaporation of the melted layer, thus resulting in no residue being left behind after the laser processing is completed.

14. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takahara et al. in view of Koyama et al.

Takahara et al. in view of Koyama et al. discloses the invention as set forth above in Claim 23, except for the surface layer being a photo-imageable layer such that the grating lines are formed in the surface layer by selectively exposing portions of the photo-imageable layer with the laser. However, Koyama et al. additionally discloses (See for example Embodiment 6 in col. 9-10 and Embodiment 11 in col. 12-14) that the various materials used for the various embodiments for creating the grating lines may include silver (Ag)-SiO₂ layers, as well as TiO₂-SiO₂ layers. It is noted that these layer materials are photo-imageable in that the interference image (which provides the grating lines for the grating) provided by the laser is directly imaged onto these layers, and the interference image is directly recorded onto these layers by ablation or evaporation. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the surface layer be a photo-imageable layer such that the grating lines are formed in the surface layer by selectively exposing portions of the photo-imageable layer with the laser, as further taught by Koyama et al., in the system of Takahara et al. in view of Koyama et al., for the purpose of reducing the manufacturing time since additional steps, such as lithography or wet etching, are not required.

Conclusion

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arnel C. Lavarias whose telephone number is 571-272-2315. The examiner can normally be reached on M-F 9:30 AM - 6 PM EST.

Art Unit: 2872

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Arnel C. Lavarias
Patent Examiner
Group Art Unit 2872
7/11/05



1/6

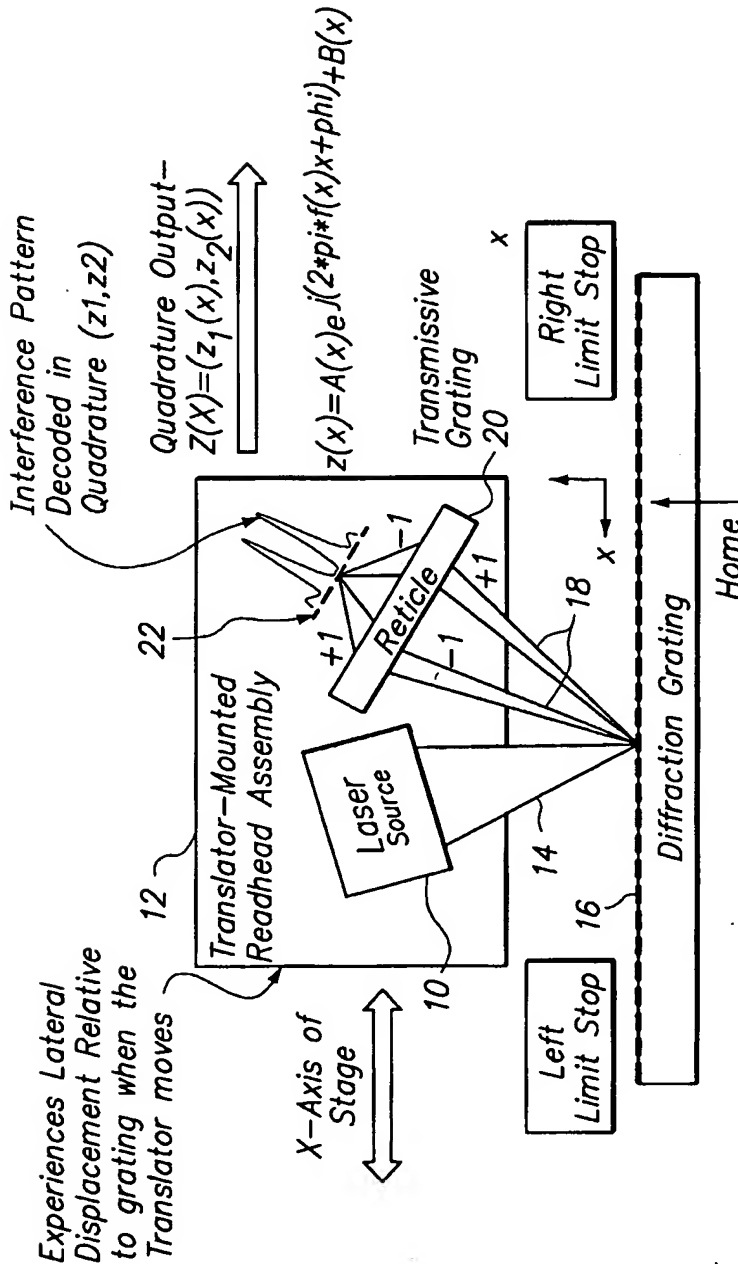


FIG. 1

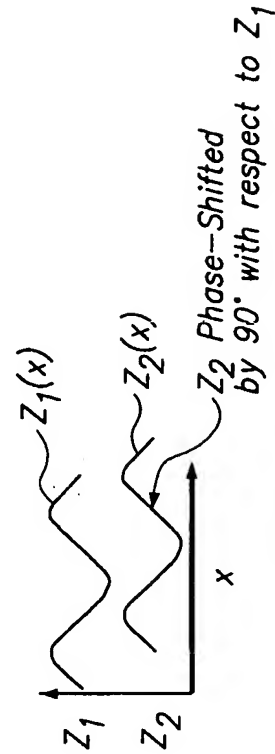


FIG. 2

Drawing Changes
 Approved
 7/11/05

2/6

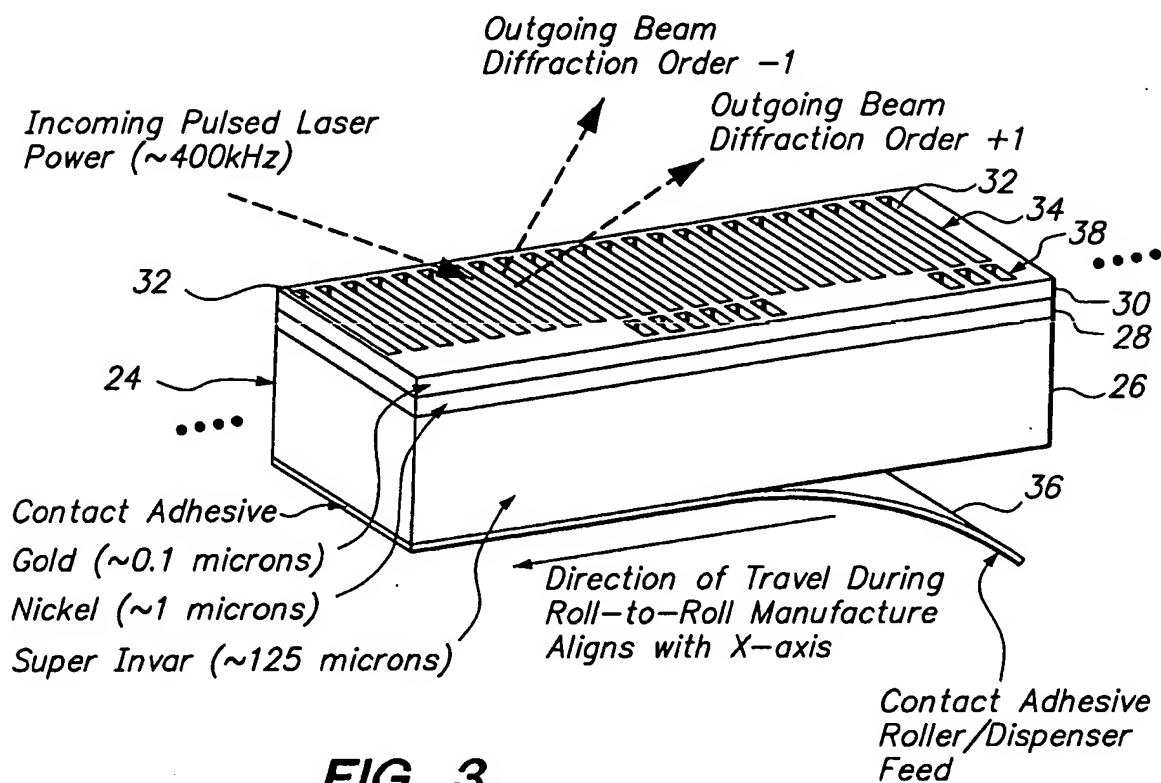


FIG. 3

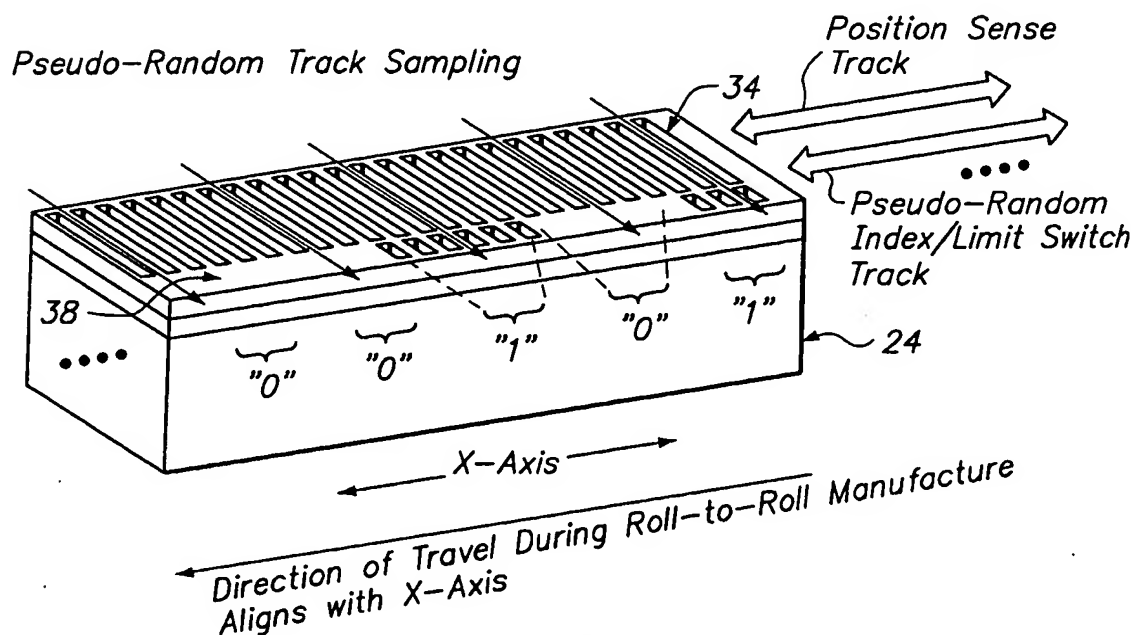


FIG. 4

3/6

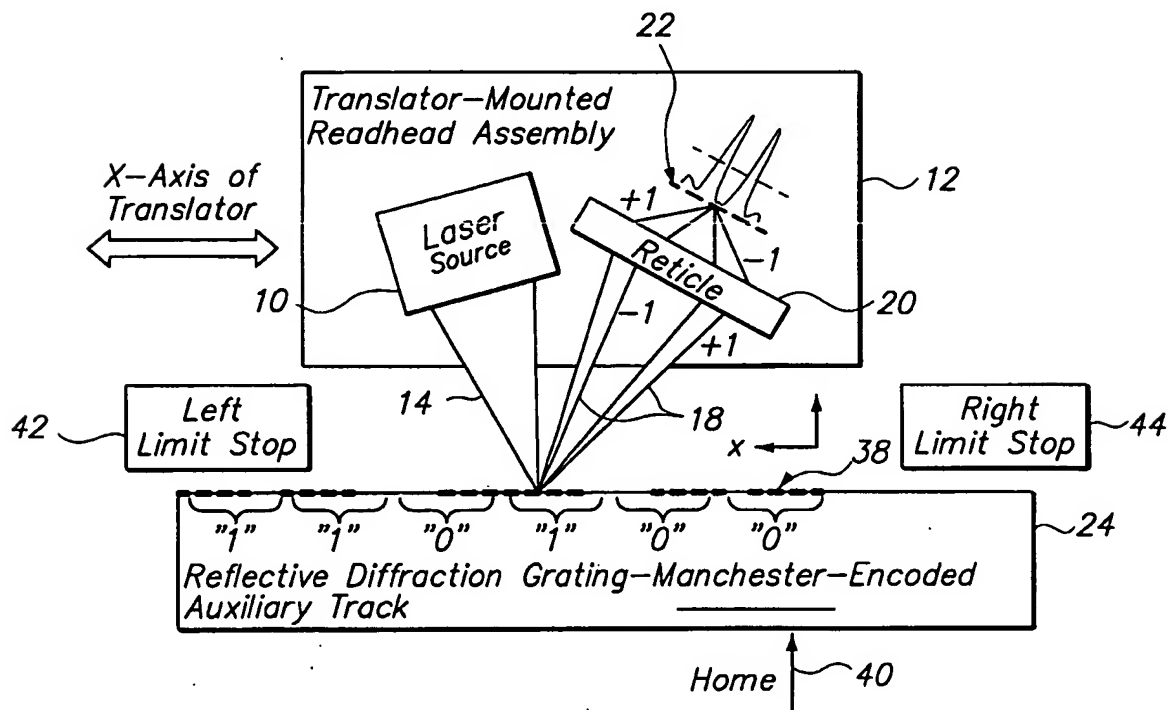


FIG. 5

4/6

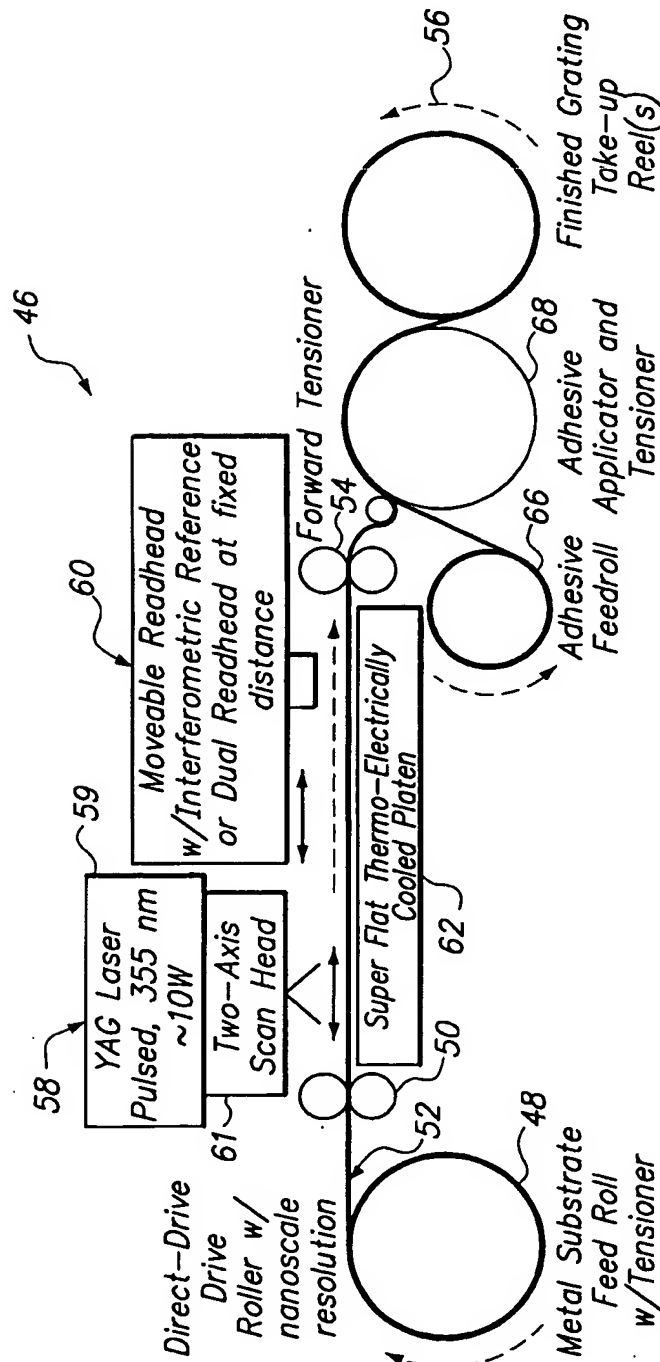
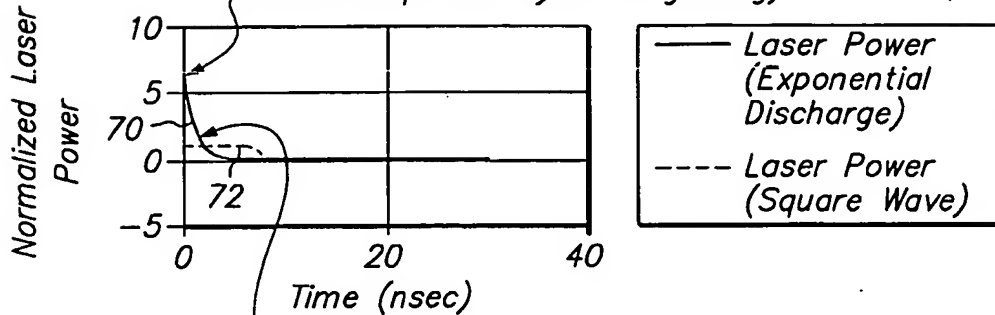


FIG. 6

5/6

Comparison of Laser Power (Exponential Discharge ($\tau=1$ ns) vs. Square Wave (7 ns) with equivalent Pulse Energy)

Front End Power Amplification ($\sim 7:1$) achieves equivalent pulse energy as Square Wave (Accelerates breaking of atomic bonds within top two layers of grating)



Tail of Exponential Pulse continues burn-off of top two layers (Time constant of pulse lies below the thermal time constant of the underlying substrate)

FIG. 7

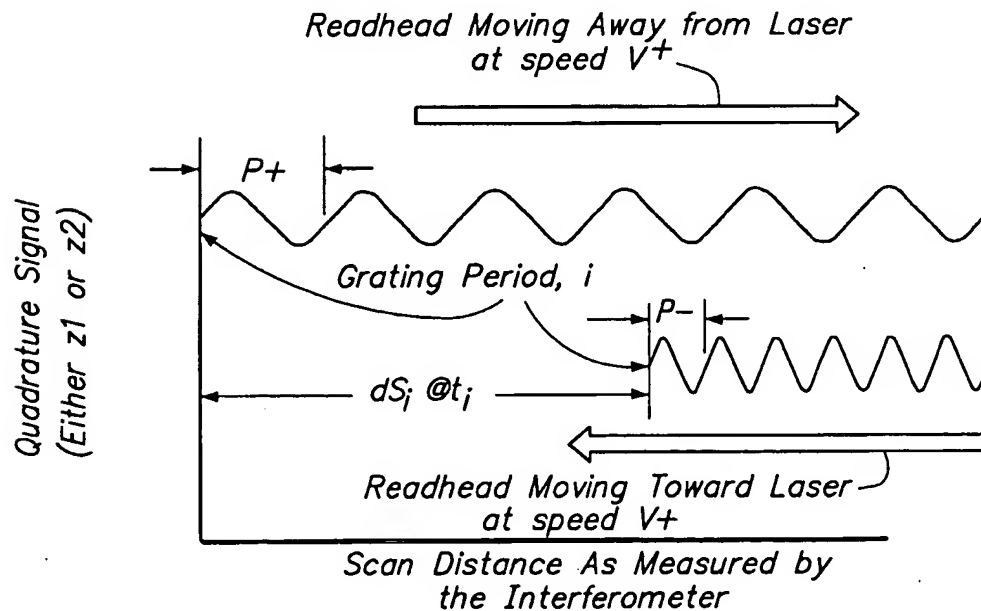


FIG. 8

6/6

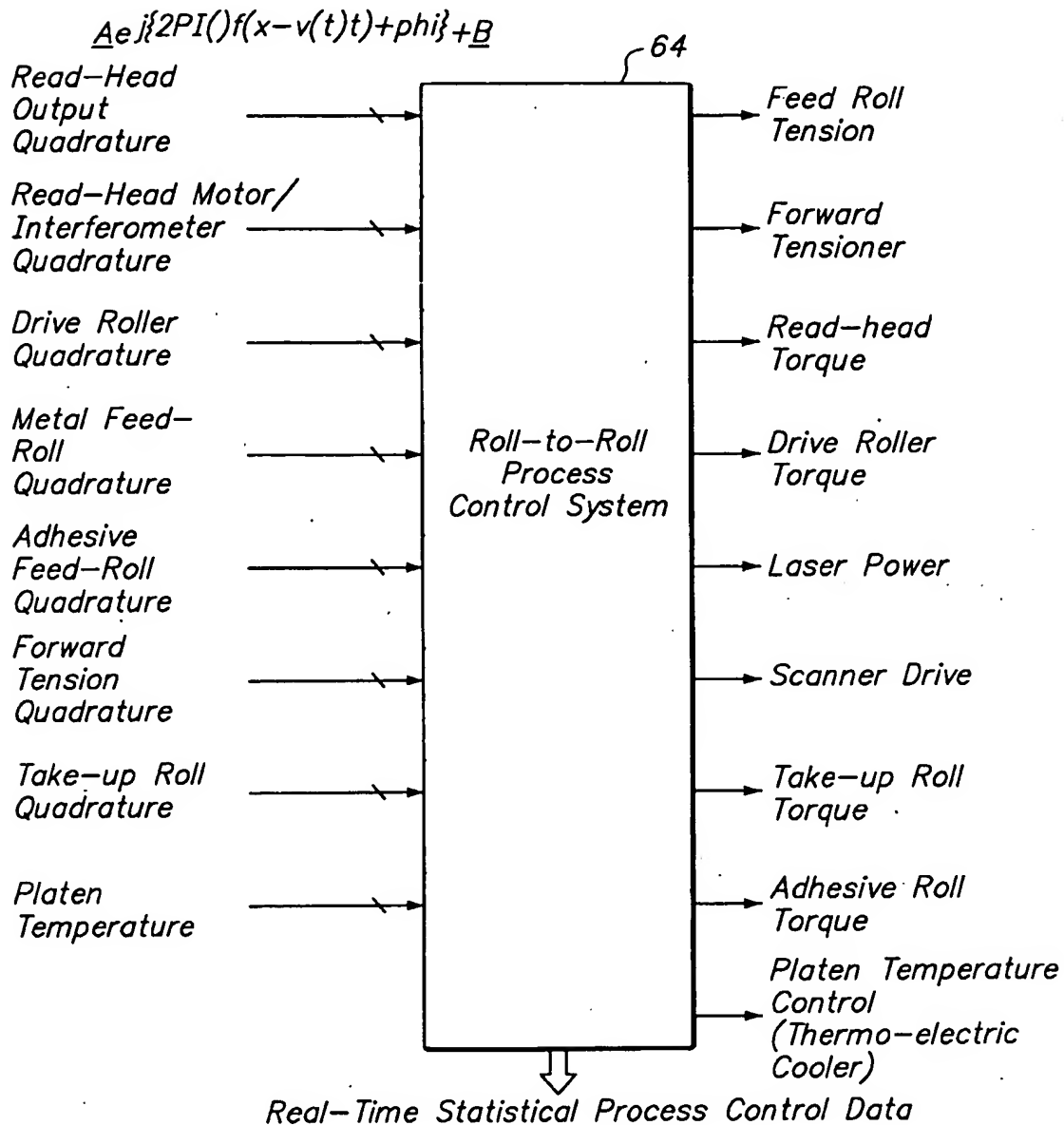


FIG. 9